

**REMARKS**

In the Final Office Action<sup>1</sup> dated December 13, 2005 (hereinafter "Final Office Action"), the Examiner: (i) rejected claims 1-4, 11-22, 27-29, 35, 40-42, and 69-79 under 35 U.S.C. § 103(a) as being unpatentable over the combination of U.S. Patent No. 6,590,217 B1 to *Freemen et al.* (hereinafter "the '217 *Freeman* patent") and U.S. Patent No. 6,626,561 B2 to *Carter et al.* (hereinafter "the '561 *Carter* patent"); (ii) rejected claims 5-10 under 35 U.S.C. § 103(a) as being unpatentable over the '217 *Freeman* patent and the '561 *Carter* patent in view of U.S. Patent No. 5,136,491 to *Kano* (hereinafter "the '491 *Kano* patent") and further in view of U.S. Patent No. 6,083,387 to *LeBlanc et al.* (hereinafter "the '387 *LeBlanc* patent"); and (iii) rejected claims 23-26, 30-34, 36-39, 43-68, 71, and 72 under 35 U.S.C. § 103(a) as being unpatentable over the combination of the '217 *Freeman* patent, the '561 *Carter* patent, the '491 *Kano* patent, and the '387 *LeBlanc* patent.

Applicants respectfully traverse the Examiner's rejection of claims 1-4, 11-22, 27-29, 35, 40-42, and 69-79 under 35 U.S.C. § 103(a) as being unpatentable over the combination of the '217 *Freeman* patent and the '561 *Carter* patent. For the reasons provided below, Applicants maintain that the Examiner has engaged in impermissible hindsight in combining the '561 *Carter* patent and the '217 *Freeman* patent. Moreover, Applicants note that one of ordinary skill in the art would appreciate that the '217 *Freeman* patent teaches against the use of lamp de-focusing. Consequently, Applicants submit that the Examiner has not made a *prima facie* case for the obviousness of claims 1-4, 11-22, 27-29, 35, 40-42, and 69-79 under 35 U.S.C. § 103(a), and

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<sup>1</sup> The Final Office Action contains a number of statements reflecting characterizations of the references cited by the Examiner and the claims. Regardless of whether any such statement is identified herein, Applicants decline to automatically subscribe to any statement or characterization in the Final Office Action.

maintain that the rejection of claims 1-4, 11-22, 27-29, 35, 40-42, and 69-79 under 35 U.S.C. § 103(a) should be withdrawn and the claims allowed.

Furthermore, Applicants respectfully traverse the Examiner's rejection of claims 5-10 under 35 U.S.C. § 103(a) as being unpatentable over the '217 *Freeman* patent and the '561 *Carter* patent in view of the '491 *Kano* patent, and further in view of the '387 *LeBlanc* patent. Likewise, Applicants respectfully traverse the Examiner's rejection of claims 23-26, 30-34, 36-39, 43-68, 71, and 72 under 35 U.S.C. § 103(a) as being unpatentable over the combination of the '217 *Freeman* patent, the '561 *Carter* patent, the '491 *Kano* patent, and the '387 *LeBlanc* patent. For the reasons provided below with respect to claims 5-10, 23-26, 30-34, 36-39, 43-68, 71, and 72, Applicants maintain that the deficiencies in the combination of the '217 *Freeman* patent and the '561 *Carter* patent are not cured by either the '491 *Kano* patent or the '387 *LeBlanc* patent. Moreover, Applicants submit that the '217 *Freeman* patent teaches against any combination with the '491 *Kano* patent. Further still, Applicants submit that the combination of the '387 *LeBlanc* patent with the '491 *Kano* patent, the '217 *Freeman* patent, and the '561 *Carter* patent—at the least—lacks the specified element relied upon by the Examiner in fashioning the rejection of claims 8, 9. Consequently, Applicants maintain that the Examiner has not made a *prima facie* case for the obviousness of claims 5-10, 23-26, 30-34, 36-39, 43-68, 71, and 72 under 35 U.S.C. § 103(a), and submit that the rejection of claims 5-10, 23-26, 30-34, 36-39, 43-68, 71, and 72 under 35 U.S.C. § 103(a) should be withdrawn and the claims allowed.

Further still, and without limitation, Applicants note that dependent claims 25, 26, 31, 39, 50, 57-59, 60-62, 72, and 74 recite additional elements not present in any of the '217 *Freeman* patent, the '561 *Carter* patent, the '491 *Kano* patent, or the '387 *LeBlanc* patent. Consequently, and in addition to the reasons mentioned above and described in more detail below, Applicants

maintain that the Examiner has not made a *prima facie* case for the obviousness of dependent claims 25, 26, 31, 39, 50, 57-59, 60-62, 72, and 74 under 35 U.S.C. § 103(a).

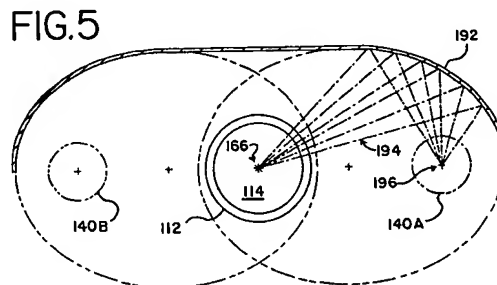
Accordingly, for at least the reasons set forth in more detail below, the rejection of claims 1-79 under 35 U.S.C. § 103(a) should be withdrawn and the claims allowed.

**The Examiner's arguments regarding the combination of the '561 Carter patent and the '217 Freeman patent**

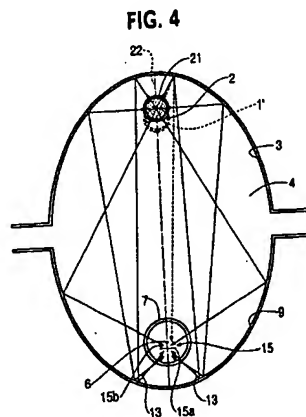
To establish a *prima facie* case of obviousness under 35 U.S.C. § 103(a), each of three requirements must be met. First, the reference or references, taken alone or combined, must teach or suggest each and every element recited in the claims (*see* M.P.E.P. § 2143 (8th ed. 2001, Rev. Aug. 2005)). Second, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art to combine the references in a manner resulting in the claimed invention. Third, a reasonable expectation of success must exist. Moreover, each of these requirements must "be found in the prior art, and not be based on applicant's disclosure." *See id.*

In both the March 23, 2005, Office Action, and the Final Office Action, the Examiner has argued:

Freeman (217) discloses a UV sterilization unit having a tubular shaped irradiation chamber formed of plural reflectors 192 and plural tubular shaped lamps 140A and 140B, aligned longitudinally such that all UV energy is focused on the fluid passageway 112, as recited in claims 1-4, 11-17, 19, 20, 27, 72, and 74-79. See Column 2, line 65-67; Column 3, line 1014; Column 6, line 15-27; and Figure 5 below.



Freeman (217) as applied above fails to teach placing the lamp in a position spaced apart from the focal axes of one of the troughs to provide a uniform irradiation distribution, as recited in claims 1, 18, 21, 22, 28, 29, 69-71, and 73. However, Carter (561) teaches defocusing the lamp within the reflector chamber to provide more uniformity of irradiation at the surface of the sample. See Column 3, line 3-9' Column 4, line 11-20; and Figure 4 below.



Therefore, it would have been obvious to one of ordinary skill in the art that the UV sterilization apparatus and method of Freeman (217) can be modified to use the source defocusing method of Carter (561), to provide a lamp spaced from the first focal point of the reflector, thereby providing a more uniformly irradiated sample surface.

(Final Office Action, paragraph 4; also March 23, 2005, Office Action, paragraph 4).

In Applicants' September 22, 2005, Response to the March 23, 2005, Office Action, Applicants noted that the '561 *Carter* patent is directed to increased uniformity of irradiation of both near and far surfaces of work pieces as set forth in Col. 5/lines 51-67 of the '561 *Carter* patent and elsewhere. In reply to Applicants September 22, 2005, Response, the Examiner cited Applicants' pending claims 21 and 69. (Final Office Action pp. 10-11.) The Examiner also cited Col. 2/lines 29-41 of the '561 *Carter* patent:

In addition, focusing of light rays 12 at second focal point  
30 6 can cause problems in uniformity when, for example, the  
fiber or fibers being treated are not solely at second focal  
point 6. For example, where a ribbon is being processed  
which has a planar surface having a width perpendicular to  
the direction of motion of the ribbon (that is, in a width  
35 direction of elliptical space 4 shown in FIG. 1), focusing of  
light rays 12 at second focal point 6 causes non-uniformity  
of light irradiating on the ribbon. Such non-uniformity is

especially disadvantageously great for light irradiating the  
surface of the ribbon facing bulb a compared with light  
40 irradiating the surface of the ribbon facing away from bulb  
1.

(Final Office Action, p. 11) as well as Col. 7/lines 10-35 of the '561 *Carter* patent:

Also shown in end reflector 32 in FIG. 8 are two holes 33, 10  
35 provided in end reflector 32. Hole 33 is provided at the  
first focal point, and hole 35 is provided displaced there-  
from. According to the present invention, the bulb can be  
supported by hole 35, for positioning the bulb with its center  
displaced from first focal point 2. Thus, in being supported 15  
by hole 35, the bulb is located a little closer to the back of  
reflector 3, which provides a little more energy coupled to  
the bulb than when the bulb is at the conventional position  
(that is, supported by hole 33). With use of the end reflector  
and location of the bulb a little closer to that of the reflector, 20  
irradiance at focus is reduced, but is increased in the far  
field. This is an improvement to the "depth of field" (a term  
for the ratio of energy getting to the near surface versus a  
farther surface). Thus, the present structure provides non-  
focused energy in the near-field (surface of the fiber or 25  
ribbon closest to the bulb) and enhanced irradiation  
(illumination) in the far-field, to improve uniformity and  
improve effectiveness of the lamps. Through displacement  
of the bulb, especially together with the use of the end  
reflector, mid- to far-field irradiation and dose for three- 30  
dimension curing is improved, overcoming one of the fun-  
damental problems in three-dimensional curing when using  
tubular lamps, which exhibits a serious fall-off of energy in  
the far-field (that is, far side of the fiber or ribbon relative to  
the bulb). 35

(Final Office Action, p. 12.)

The Examiner then argued (Final Office Action, pp. 12-13):

The examiner has interpreted from the applicant's claims above and the Carter (561) references above, that adjusting the position of the source away from the focal point of the reflector is performed by both the applicant and Carter (561) to obtain the same result: i.e., to provide uniform irradiation distribution of the sample, which is governed by the same fundamental principle of optics, "depth of field". In fact, Carter (561) uses defocusing to eliminate the disadvantages produced by non-uniformity of irradiation at the sample surface. Thus the teaching of Carter (561) is applicable to providing uniformity of radiation for any material passing through the sample passageway (quartz tube 7), solid or liquid, and is therefore analogous art.

In addition, one of ordinary skill in the art of irradiation chambers having primary and secondary elliptical shaped reflectors as used by Freeman (217) would be motivated to utilize the Carter (561) invention to overcome non-uniformity of irradiation at the sample, which according to Carter (561) is a fundamental problem associated with their use.

**The Examiner has engaged in impermissible hindsight in combining the '561 Carter patent and the '217 Freeman patent**

Applicants first note that the Examiner has failed to establish that the teachings '217 *Freeman* patent and the '561 *Carter* patent are from analogous arts. Rather, the Examiner has clarified in the Final Office Action that Examiner's combination of the '217 *Freeman* patent and the '561 *Carter* patent is based upon Examiner's assertion that Applicants' disclosure and the '561 *Carter* patent are from analogous arts :

The examiner has interpreted from the applicant's claims above and the Carter (561) references above, *that adjusting the position of the source away from the focal point of the reflector is performed by both the applicant and Carter (561) to obtain the same result: i.e., to provide uniform irradiation distribution of the sample, which is governed by the same fundamental principle of optics, "depth of field".*

(Final Office Action, pp. 12-13, emphasis added).

In response, Applicants note that the inquiry is not whether the Applicants' disclosure and a reference relied upon under 35 U.S.C. § 103(a) are from analogous arts. Rather, the proper inquiry is whether the teachings of the '217 *Freeman* patent and the '561 *Carter* patent are from analogous arts.<sup>2</sup> (*See, for example*, M.P.E.P. § 1504.03 (1) (8th ed. 2001, Rev. Aug. 2005) "[w]hen a modification a basic reference involves a change in configuration, both the basic and secondary references must be from analogous arts.")

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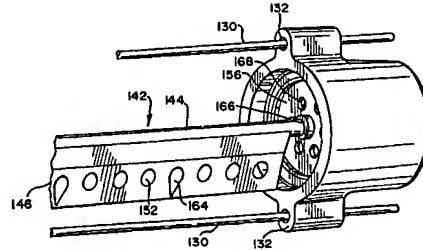
<sup>2</sup> Applicants note that while the Examiner may argue that the '561 *Carter* patent suggests a "fundamental problem" associated with the apparatus of the '217 *Freeman* patent, (Final Office Action, p. 13), Applicants find no such observation in the '561 *Carter* patent. Applicants submit that one of ordinary skill in the art would appreciate that the '561 *Carter* patent is directed to irradiating the three-dimensional surface of a work piece (which may or may not be opaque to UV radiation), while the '217 *Freeman* patent is directed to irradiating a fluid volume that is preferably translucent to UV radiation—*i.e.*, water (Col. 1/lines 10-11). To the extent that the Examiner finds the issue addressed in the '561 *Carter* patent applicable to the apparatus of the '217 *Freeman* patent, Applicants respectfully submit that the Examiner has found such a connection in Applicants' disclosure only.

In this regard, the Examiner's clarification at pp. 9-13 of the Final Office Action indicates that the Examiner is relying upon Applicants' disclosure to find a motivation to combine. For example, rather than citing any portion of the '217 *Freeman* patent that would suggest that the '561 *Carter* patent is analogous art, or citing any portion of the '561 *Carter* patent that would suggest that the '217 *Freeman* patent is analogous art, the Examiner cites to Applicants' pending claims 21 and 69. (*See, for example*, the Final Office Action, pp. 10-11.)

For at least this reason, Applicants respectfully traverse the Examiner's alleged basis for combining the '217 *Freeman* patent and the '561 *Carter* patent, and submit that the Examiner's reliance upon Applicants' pending claims 21 and 69 as a basis for combining the '217 *Freeman* patent and the '561 *Carter* patent constitutes impermissible hindsight. Although the Examiner is permitted a variety of rationales to combine references, such as common knowledge in the art, scientific principles, art-recognized equivalents, or legal precedent (*see, for example*, M.P.E.P. § 2144), it is well-settled that "[t]he teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, not in applicant's disclosure" (M.P.E.P. § 2143). For at least this reason, Applicants submit that the Examiner has not made a *prima facie* case for obviousness under 35 U.S.C. § 103(a).

**The '217 *Freeman* patent teaches away from the use of lamp de-focusing**

Applicants further submit that the '217 *Freeman* patent teaches away from the use of lamp de-focusing—which is relied upon by the Examiner in fashioning the rejection. Applicants first note that the '217 *Freeman* patent is directed to a system that incorporates a central wiper (142) to clean the inside surface of a fluid chamber, where the fluid in the chamber (and, more particularly, water) is irradiated by UV light:



The only portions of the written description in the '217 *Freeman* patent that disclose the position of UV lamps and that pertain to the transmission of UV energy to the fluid being irradiated are Col. 2/line 65–Col. 3/line 14; Col. 4/lines 46-63; and Col. 6/lines 15-27, reproduced below (emphasis added):

One embodiment of the apparatus of the present invention provides irradiation of a fluid with UV light and includes a tubular body consisting of a UV-permeable material. The tubular body includes an inner surface defining a fluid chamber and open first and second ends for ingress and egress of the fluid through the fluid chamber. At least one UV radiation source is provided and is so arranged relative to the tubular body as to subject the chamber to the UV light. A wiper is centrally supported in said body for rotation therein, sized and shaped to contact the inner surface. First and second light baffles are positioned inside the tubular body adjacent respective first and second ends and define an irradiated section of the fluid chamber therebetween to prevent UV light penetration beyond the irradiated section of the fluid chamber while permitting the fluid to flow through the apparatus.

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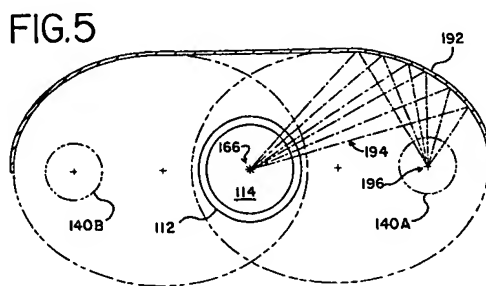
A UV radiation source 140 is arranged about the outside 138 of the tubular body 112. The source 140, in the illustrated embodiment, may include a pair of UV lamps 140A, 140B designed to emit a high concentration or percentage of ultraviolet light. The UV lamps 140A, 140B are arranged to provide a maximum penetration of UV light through the tubular body 112 and ensure a maximum exposure of the fluid 116 to the emitted UV radiation. The present invention contemplates providing any effective arrangement of UV light sources, which can be a single lamp or a plurality of lamps arranged about the tubular body 112.

\* \* \*



15 An embodiment of the invention includes a plurality of  
high efficiency reflectors 192, (one is shown) formed in the  
illustrated embodiment shown in FIG. 5, of two symmetrical  
parts, which collect and focus scattered light emitted from  
the lamps 140A, 140B to the center of the tubular body 112  
20 with the use of elliptical geometry. As shown, light rays 194,  
which originate from axial center 196 of lamp 140A are  
reflected to axial center 166 of tubular body 112, i.e., the  
axial center of the fluid chamber 114. In this manner, nearly  
25 all of the emitted UV light from lamps 140A, 140B is used  
in irradiating fluid 116 in fluid chamber 114 of tubular body  
112.

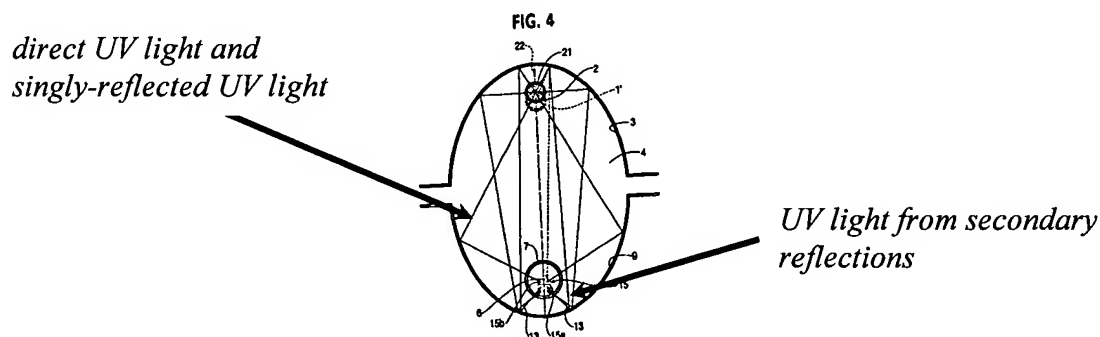
Applicants submit that, according to the plain language, the disclosure in the '217  
*Freeman* patent teaches, at most, the desirability of using "all of the emitted UV light" from the  
lamps (Col. 6/line 24), to provide the "maximum penetration of UV light" through fluid chamber  
114, and "ensure maximum exposure of the fluid" (Col. 4/lines 57-60) to the UV light. The  
arrangement taught by the '217 *Freeman* patent to irradiate the fluid in this manner is that  
depicted in FIG. 5, which depicts two sources of UV light spaced on either side of the fluid  
chamber 114, and further where the UV light from each source is directly focused to the axial  
center of the fluid chamber 114 through the use of elliptical geometry:



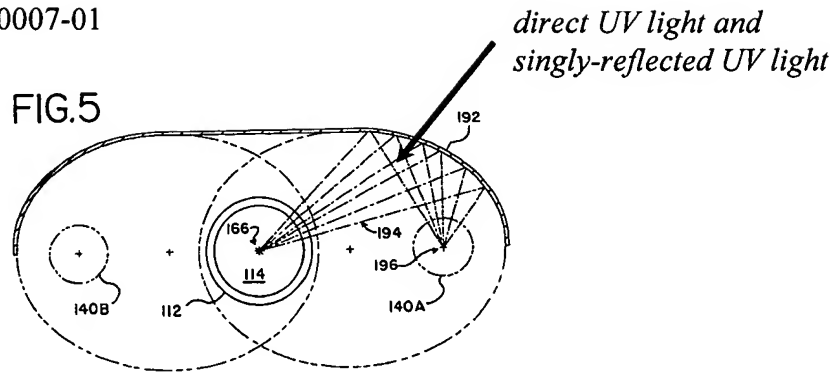
Significantly, the disclosure of the '217 *Freeman* patent does not expressly, inherently, or  
otherwise, rely upon secondary reflections to irradiate fluid chamber 114. In fact, Applicants  
submit that one skilled in the art would appreciate that the arrangement of the '217 *Freeman*  
patent corresponds to an irradiance pattern that is sharply peaked about the center of fluid

chamber 114, and retains much of the original energy that is output by UV lamps 140A and 140B, thereby achieving the stated goal of using “all of the emitted UV light” from the lamps (Col. 6/line 24), to provide the “maximum penetration of UV light” through fluid chamber 114, and “ensure maximum exposure of the fluid” (Col. 4/lines 57-60) to the UV light.

In sharp contrast, the disclosure of the '561 *Carter* patent teaches the desirability of reducing the energy flux of UV light that directly strikes one side of a three-dimensional work piece, so as to increase (through secondary reflections) the amount of energy flux of UV light that strikes the opposite side of such a work piece. Applicants submit that one of ordinary skill in the art would appreciate this effect through FIG. 4 of the '561 *Carter* patent—relied upon by the Examiner:



Again, Applicants note that the '217 *Freeman* patent does not disclose, inherently or otherwise, the use of secondary reflections to provide UV light to fluid chamber 114. In contrast, the solution of the preferred embodiment in the '217 *Freeman* patent is to simply use two—easily replaceable—light sources, with each source spaced to either side of fluid chamber 114:



For at least the above reason, Applicants submit that one skilled in the art applying the disclosure the '217 *Freeman* patent would not be motivated by the '561 *Carter* patent to implement the defocusing of light sources 140A and 140B. Specifically, one skilled in the art would appreciate that the only effect of lamp de-focusing as taught in the '561 *Carter* patent on the arrangement disclosed in the '217 *Freeman* patent would be a decrease in the maximum penetration of energy flux through fluid chamber 114.

Because the '217 *Freeman* patent teaches the desirability of the exact opposite effect (*i.e.*, using "all of the emitted UV light" from the lamps (Col. 6/line 24), to provide the "maximum penetration of UV light" through fluid chamber 114, and "ensure maximum exposure of the fluid" (Col. 4/lines 57-60) to the UV light), Applicants submit that the '217 *Freeman* patent teaches away from the use of lamp defocusing.

For at least this additional reason, Applicants submit that the rejection of claims 1-4, 11-22, 27-29, 35, 40-42, and 69-79 under 35 U.S.C. § 103(a) should be withdrawn and the claims allowed.

**The deficiencies in the combination of the '217 *Freeman* patent and the '561 *Carter* patent are not cured by either the '491 *Kano* patent or the '387 *LeBlanc* patent**

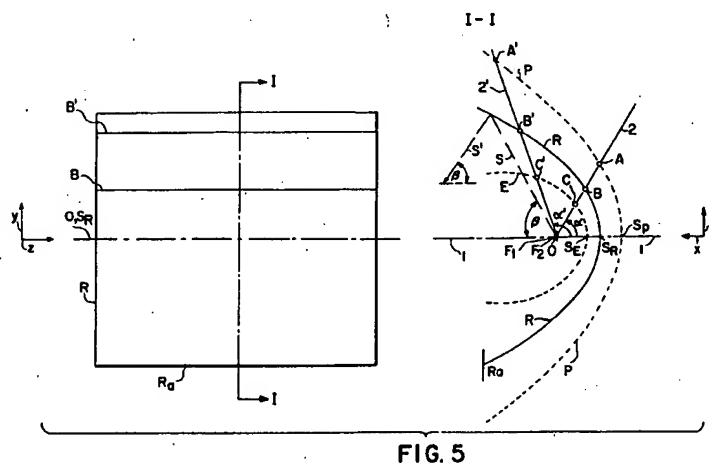
Furthermore, Applicants respectfully traverse the Examiner's rejection of claims 5-10 under 35 U.S.C. § 103(a) as being unpatentable over the '217 *Freeman* patent and the '561 *Carter* patent in view of the '491 *Kano* patent, and further in view of the '387 *LeBlanc* patent.

Likewise, Applicants respectfully traverse the Examiner's rejection of claims 23-26, 30-34, 36-39, 43-68, 71, and 72 under 35 U.S.C. § 103(a) as being unpatentable over the combination of the '217 *Freeman* patent, the '561 *Carter* patent, the '491 *Kano* patent, and the '387 *LeBlanc* patent. To begin with, Applicants note that the deficiencies in the combination of the '217 *Freeman* patent and the '561 *Carter* patent are not cured by either the '491 *Kano* patent or the '387 *LeBlanc* patent.

With regard to the '491 *Kano* patent, the Examiner has stated (Final Office Action, paragraph 5, pp. 4-5):

The combination of Freeman (217) and Carter (561) fails to teach the use of the reflector shapes recited in claim 5-7, and 10. However Kano (491) discloses the use of elliptical, parabolic and segmented reflector shapes, as recited in claims 5-7, and 10. See Column 1, line 10-16; Column 6, line 1-14; and Figure 5 below.

Therefore, it would have been obvious to one of ordinary skill in the art that the UV sterilization apparatus and method of Freeman (217), and Carter (561), can be modified to use the reflector shaping method of Kano (491), to provide various reflector forms, but also providing the lamp designer with a method enabling him to design an optimum reflector form in dependence upon the given marginal conditions for the lamp and the desired light distribution.



Likewise, with regard to or the '387 *LeBlanc* patent, the Examiner has stated (Final Office Action, paragraph 5, p. 5):

The combination of Freeman (217), Carter (561), and Kano (491) fails to teach the use of a V shaped reflector, as recited in claims 8 and 9. However LeBlanc (387) teaches the use of a V shaped reflector. See Figure 1 below.

Therefore it would have been obvious to one of ordinary skill in the art that the sterilization apparatus and method of Freeman (217), carter (561), and Kano (491) can be modified to use the V shaped reflector of LeBlanc (387), to provide fluid exposure to the radiation that can be optimized by creating an orientation pattern of UV lamps around the tubing with ultraviolet reflective surfaces directing the radiation toward the fluid.

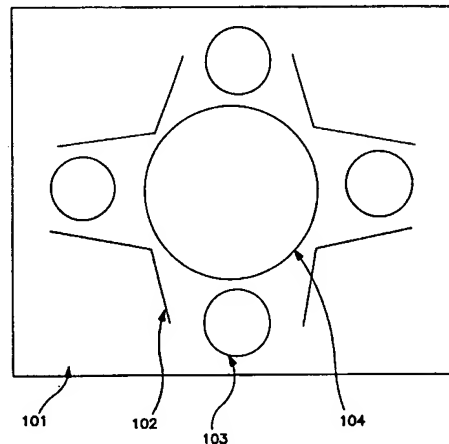


FIG. 1

Without subscribing to the Examiner's characterizations of the '491 *Kano* patent and the '387 *LeBlanc* patent, Applicants respectfully submit that the disclosure of the '491 *Kano* patent and the disclosure of the '387 *LeBlanc* patent are both devoid of any suggestion, inherently or otherwise, of any advantage to reducing the energy flux of direct and singly-reflected UV light (as suggested by the '561 *Carter* patent) on a fluid volume as is configured in the '217 *Freeman* patent.

Rather, the '491 *Kano* patent is related to reflectors for lamps that are being used for "lighting a room, illuminating an object or also for coupling light into an optical waveguide" (Col. 1/lines 8-10). Similarly, while the '387 *LeBlanc* patent "relates to apparatus and methods for the disinfection of fluids" (Abstract/lines 1-2), the disclosure of '387 *LeBlanc* patent

emphasizes the importance of positioning UV lamps 103 and reflectors 102 “so as to maximize exposure of the fluid in tube 104 to the available radiation.” (Col. 10/lines 2-5, and FIG. 1, below):

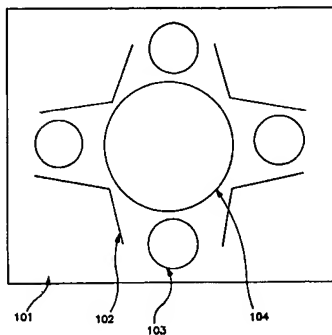


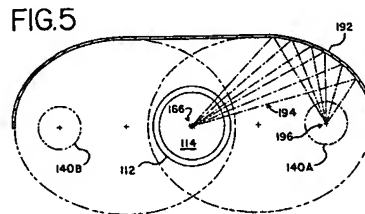
FIG. 1

Accordingly, Applicants submit that the deficiency in the combination of the '217 *Freeman* patent and the '561 *Carter* patent is not cured by the disclosure of either the '491 *Kano* patent or the '387 *LeBlanc* patent. For at least this reason, Applicants submit that the Examiner has not made a *prima facie* case for the obviousness of claims 5-10, 23-26, 30-34, 36-39, 43-68, 71, and 72 under 35 U.S.C. § 103(a), and respectfully request that the rejection of claims 5-10, 23-26, 30-34, 36-39, 43-68, 71, and 72 under 35 U.S.C. § 103(a) should be withdrawn and the claims allowed.

**The '217 *Freeman* patent teaches against any combination with the '491 *Kano* patent**

Furthermore, Applicants submit that the '217 *Freeman* patent teaches against any combination with the '491 *Kano* patent. As Applicants have noted, the disclosure in the '217 *Freeman* patent teaches, at most, the desirability of using “all of the emitted UV light” from the lamps (Col. 6/line 24), to provide the “maximum penetration of UV light” through fluid chamber 114, and “ensure maximum exposure of the fluid” (Col. 4/lines 57-60) to the UV light. To achieve this result, the '217 *Freeman* patent relies upon the “use of elliptical geometry” (Col.

6/line 20). Applicants submit that one skilled in the art would appreciate that FIG. 5 of the '217 *Freeman* patent illustrates such an application of “elliptical geometry” as evidenced by the dashed lines superimposed on reflectors 192:



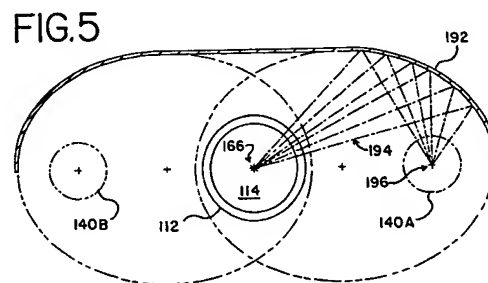
Such an understanding of the use of “elliptical geometry” is echoed in the '491 *Kano* patent (Col. 1/lines 20-27, emphasis added):

a) Ellipse

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The ellipse is, defined by two parameters, that is the major semiaxis a and the minor semiaxis b. Rays emanating from a focal point of the ellipse are reflected by the ellipsoid reflector so that they are condensed at the other focal point, the rays thereafter being propagated with a relatively large angle.

In contrast, however, the Examiner relies upon the '491 *Kano* patent to teach, for example, a parabolic reflector shape as recited in claim 5. (See, for example, the Final Office Action, paragraph 5, p. 4.) Applicants submit, however, that one of ordinary skill in the art would appreciate that a parabolic reflector shape, or any shape other than an ellipse, will not directly focus light to a focal point as is required for operation of the apparatus in the '217 *Freeman* patent:



Rather, a parabolic reflector shape will redirect rays emanating from a focal point so that they are completely parallel. Such an understanding of parabolic reflector shapes, as well as hyperbolic reflector shapes is set forth in the '491 *Kano* patent (Col. 1/lines 28-42, emphasis added):

b) Parabola

The parabola is defined by one parameter (usually 30 denoted "p"). Rays emanating from the focal point of the paraboloid are reflected by the reflector in such a manner that they run parallel to the optical axis.

c) Hyperbola

35

The hyperbola is defined by two parameters, the real semiaxis a and the imaginary semiaxis b. Rays emanating from the focal point are reflected so that they move away from the optical axis. The spreading of the rays is a function of the distance from the optical axis; the 40 nearer the ray to the optical axis the more acute the angle relative to the optical axis.

Consequently, Applicants submit that one skilled in the art would appreciate that the use of a parabolic reflector shape as taught in the '491 *Kano* patent runs completely counter to the stated goal in the disclosure in the '217 *Freeman* patent, which teaches the desirability of using "all of the emitted UV light" from the lamps (Col. 6/line 24), to provide the "maximum penetration of UV light" through fluid chamber 114, and "ensure maximum exposure of the fluid" (Col. 4/lines 57-60) to the UV light. Accordingly, Applicants submit that the '217 *Freeman* patent teaches against any combination with the '491 *Kano* patent as proposed by the Examiner.

Consequently, for at least this additional reason, Applicants submit that the Examiner has not made a *prima facie* case for the obviousness of claims 5-10, 23-26, 30-34, 36-39, 43-68, 71, and 72 under 35 U.S.C. § 103(a), to the extent that the Examiner is relying on a combination of the '217 *Freeman* patent and the '491 *Kano* patent, and respectfully request that the rejection of



claims 5-10, 23-26, 30-34, 36-39, 43-68, 71, and 72 under 35 U.S.C. § 103(a) be withdrawn and the claims allowed.

**The combination of the '387 LeBlanc patent, the '491 Kano patent, the '217 Freeman patent, and the '561 Carter patent lacks the specified element relied upon by the Examiner in fashioning the rejection of claims 8, 9**

Further still, Applicants note with respect to pending claims 8 and 9 that the Examiner has relied upon the combination of the '217 *Freeman* patent, the '561 *Carter* patent, the '491 *Kano* patent, and FIG 1 of the '387 *LeBlanc* patent:

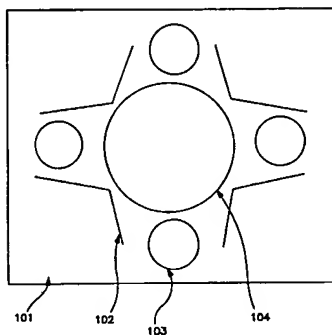


FIG. 1

Applicants respectfully traverse Examiner's rejection as the alleged combination—at the least—lacks the recited “first flat reflector” and “second flat reflector” in the recited relationship (emphasis added):

8. Apparatus according to claim 1, wherein each trough has a longitudinal axis, and wherein each reflector of said first set of reflectors is segmented and comprises:  
a first flat reflector segment extending from a first one of said troughs at an angle to the longitudinal axis of such trough; and  
a second flat reflector segment extending from a second one of said troughs at an angle to the longitudinal axis of that trough and cooperating with said first flat reflector segment to define a V substantially midway between said troughs.

9. Apparatus according to claim 8, wherein the V forms an angle of substantially 90°.

Applicants respectfully remind the Examiner that claim 1—upon which claims 8 and 9 depend—recites “at least two reflecting troughs” and further recites “the open end of the first

trough facing the open end of the second trough to define a space between the closed ends of said troughs.” Applicants respectfully submit that the ’387 *LeBlanc* patent is devoid, inherently or otherwise, of such a configuration of: first trough; second trough; first flat reflector segment; and second flat reflector segment. Specifically, Applicants submit that for any alleged first trough and first flat reflector segment that may be disclosed in the ’387 *LeBlanc* patent, there is no “second trough” and “second flat reflector segment” such that both “the open end of the first trough facing the open end of the second trough to define a space between the closed ends of said troughs,” as recited, and the “first flat reflector segment” and “second flat reflector segment” “define a V substantially midway between said troughs” as recited.

Consequently, for at least this additional reason, Applicants submit that the Examiner has not made a *prima facie* case for the obviousness of claims 8 and 9 under 35 U.S.C. § 103(a) and respectfully request that the rejection of claims 8 and 9 under 35 U.S.C. § 103(a) be withdrawn and the claims allowed.

**Dependent claims 25, 26, 31, 39, 50, 57-59, 60-62, 72, and 74 recite additional elements not present in any of the ’217 Freeman patent, the ’561 Carter patent, the ’491 Kano patent, or the ’387 LeBlanc patent**

Further still, and without limitation, Applicants note that dependent claims 25, 26, 31, 39, 50, 57-59, 60-62, 72, and 74 recite additional elements not present in any of the ’217 *Freeman* patent, the ’561 *Carter* patent, the ’491 *Kano* patent, or the ’387 *LeBlanc* patent.

For example, claims 25 and 26 recite “wherein each trough has a longitudinal axis, and the longitudinal axes define a figure having a center of symmetry”; claims 31 and 39 recite “wherein said two troughs have non-coinciding longitudinal axes”; claim 50 recites “wherein said fluid passageway has a central axis passing through the center of symmetry of a figure defined by the points of intersection of the longitudinal axes of said troughs”; and claims 72 and

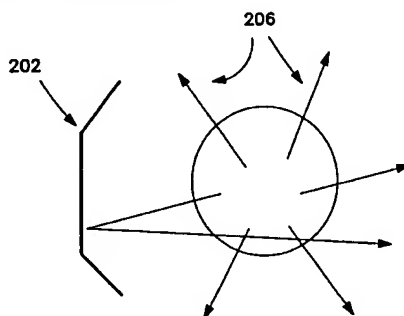
74 recite “wherein said at least one trough has a longitudinal axis and is shifted in a direction substantially perpendicular to the longitudinal axis of such trough.”

Applicants submit that claims 25, 26, 31, 39, 50, 72, and 74 recite arrangements of longitudinal axes and troughs that are not in any of the references relied upon by the Examiner.

In contrast, the Examiner has cited various Figures as (Final Office Action, pp. 6-8):

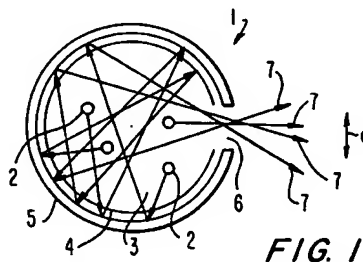
evidence that one skilled in the art would be motivated to rearrange the locations of sources and samples in an irradiation apparatus to optimize the intensity distribution in the sample;

Figure 2b in U.S. Patent No. 6,083,387;

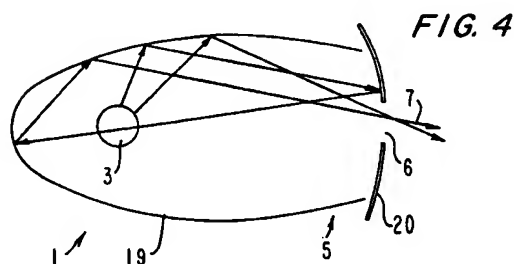


**FIG. 2B**

Figure's [sic] 1 and 4 in U.S. Patent No. 5,989,283;



**FIG. 1**



**FIG. 4**

Figure's [sic] 4 and 5 in U.S. Patent No. 4,694,179;

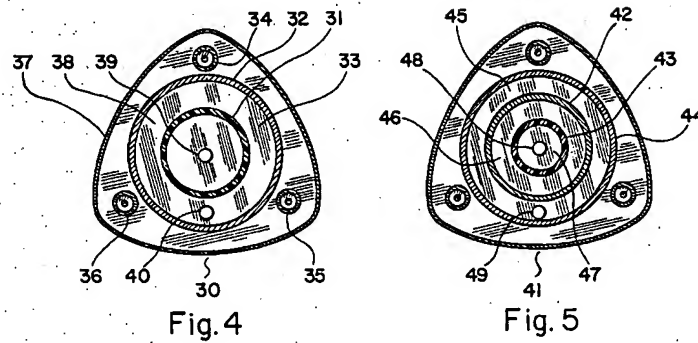


Figure 3 in U.S. Patent No. 6,707,048;

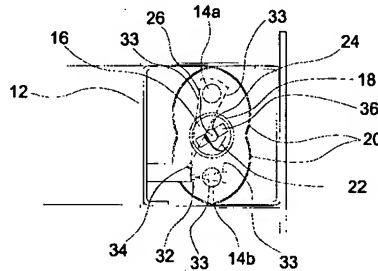


FIG. 3

Applicants submit that none of the references relied upon, or Figures cited by the Examiner depict, inherently or otherwise, among other elements, the arrangement of longitudinal axes and troughs recited in claims 25, 26, 31, 39, 50, 72, and 74. For example, to the extent that any of the Figures above depict more than one reflector/radiation source arrangement, Applicants submit that the respective longitudinal axes of such plurality of reflector/radiation sources do not define a figure having a center of symmetry.<sup>3</sup>

<sup>3</sup> For avoidance of doubt, Applicants note in passing that the elements identified by the reference number "2" in Figure 1 of U.S. Patent No. 5,989,283 are, in fact, gas molecules (*see* Col. 5/lines 22-23).

Further still, Applicants note that claims 57-59 and 60-62 recite “further comprising a mount for each trough, making the position of each trough adjustable.” The Examiner has stated that

it would have been obvious to one having ordinary skill in the art at the time the invention was made to make adjustable, since it have [sic] been held that adjustability, where needed, involves only routine skill in the art. One would have been motivated to make the source mount, trough mount and fluid passageway adjustable for the purpose of changing the their [sic] respective positions to optimize the irradiation.

(Final Office Action, p. 9.)

Applicants respectfully traverse Examiner’s assertion and note another aspect of the apparatus disclosed in the ’217 *Freeman* patent that is indicated as desirable: namely the modular design of the apparatus and the ease with which the apparatus may be repaired. For example (Col 7/lines 35-57, emphasis added):

The embodiment shown in FIG. 17 illustrates the four <sup>35</sup>  
basic modules of the present invention and how the unit 210  
is assembled. Back cover 214 may include tubular body 112  
and other components associated with assembly 110. Inner  
cover 220 includes electrical components, such as ballast  
240, electronics module 226, light sensor 222 including <sup>40</sup>  
sensor card 242 and the radiation sources 140 fastened  
thereto. The inner cover 220 is fastened to back cover 214.  
The front cover includes reflector 192 and is fastened over  
inner cover 220 to complete assembly of the unit. The order  
of assembly may be changed without changing the spirit of <sup>45</sup>  
the invention. Further, the specific arrangement of compo-  
nents of the unit may be changed into various configurations  
that contemplate the invention. It can be seen that replace-  
ment of any or more than one component of the unit 210 can  
be performed quickly by virtue of the modular design of the  
invention and lateral access thereto. It can be seen that <sup>50</sup>  
maintenance personnel need only detach the front cover 212  
to access the radiation sources 140 and remove the radiation  
sources in a lateral direction. Removal of the inner cover 220  
permits access to all of the electronic components 226, 242  
and 240 and the remainder of the assembly 110 including the <sup>55</sup>  
tubular body 112, outlet and inlet 126, 128 and associated  
components.

Applicants submit that the disclosure of the ’217 *Freeman* patent teaches against the adjustability proposed by the Examiner; one skilled in the art would appreciate that adjustability

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of any identified “trough” in the apparatus of the ’217 *Freeman* patent does not follow from the expressly described “modular” design of such apparatus.

Consequently, and in addition to the reasons described in detail above, Applicants maintain that the Examiner has not made a *prima facie* case for the obviousness of dependent claims 25, 26, 31, 39, 50, 57-59, 60-62, 72, and 74 under 35 U.S.C. § 103(a).

**Conclusion**

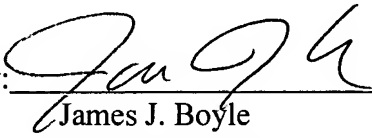
For at least the reasons set forth in detail above, the rejection of claims 1-79 under 35 U.S.C. § 103(a) should be withdrawn and the claims allowed. In view of the foregoing remarks, Applicants request the Examiner’s reconsideration and reexamination of the application, and the timely allowance of the pending claims.

Please grant any extensions of time required to enter this response and charge any additional required fees to our deposit account 06-0916.

Respectfully submitted,

FINNEGAN, HENDERSON, FARABOW,  
GARRETT & DUNNER, L.L.P.

Dated: March 13, 2006

By:   
James J. Boyle  
Reg. No. 46,570

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